Listing of Claims

1. (Currently Amended) A method of protecting an exposed copper surface of a partially fabricated IC from oxidation during exposure to an oxygen-containing environment, the method comprising:

contacting the exposed copper surface with a metallocene compound; and

contacting the exposed copper surface with the oxygen-containing environment, whereby exposure to the metallocene compound minimizes formation of copper oxide on the exposed copper surface; wherein the metallocene compound contains a metal bound to one or more cyclopentadienyl ligands.

2. (Currently Amended) The method of claim 1, wherein the metallocene contains a metal selected from the group consisting of ruthenium, cobalt, nickel, iron, palladium, platinum, titanium, chromium, osmium, and manganese, ~~and cobalt~~.

3. (Original) The method of claim 1, wherein the metallocene is ruthenocene.

4. (Original) The method of claim 1, wherein contacting the exposed copper surface with a metallocene compound comprises flowing a gas containing metallocene over the partially fabricated IC.

5. (Original) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper surface with a compound that forms a solid phase layer on the partially fabricated IC.

6. (Previously Presented) The method of claim 5, wherein the compound is a precursor compound that reacts with an oxygen-containing species to form the solid phase layer.

7. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper surface with a diffusion barrier precursor, which reacts with an oxygen-containing species to form a barrier layer on the partially fabricated IC.

8. (Previously Presented) The method of claim 7, wherein the oxygen-containing species is molecular oxygen.

9. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper

surface with an etch stop precursor, which reacts with an oxygen-containing species to form an etch stop layer on the partially fabricated IC.

10. (Previously Presented) The method of claim 1, wherein contacting the exposed copper surface with the oxygen-containing environment comprises contacting the exposed copper with the ambient or other oxygen-containing environment during storage or transport between processing modules.

11. (Previously Presented) The method of claim 1, wherein the exposed copper surface comprises a copper seed layer on the partially fabricated IC.

12. (Currently Amended) A method of passivating and using an exposed copper surface of a partially fabricated IC, the method comprising:

contacting the exposed copper surface with a metallocene compound to thereby passivate the surface; wherein the metallocene compound contains a metal bound to one or more cyclopentadienyl ligands; and

depositing a layer of material on the exposed copper surface ~~partially fabricated IC~~ using an oxygen-containing deposition chemistry.

13. (Previously Presented) The method of claim 12 further comprising performing the contacting and depositing step in a single chamber.

14. (Previously Presented) The method of claim 12 wherein the depositing is conducted using the metallocene compound as a chemical precursor to the material.

15. (Previously Presented) The method of claim 12 wherein the contacting and depositing operations are done concurrently.

16. (Currently Amended) The method of claim 12, wherein the metallocene is contains a metal selected from the group consisting of ruthenium, cobalt, nickel, iron, palladium, platinum, titanium, chromium, osmium, and manganese~~, and cobalt~~.

17. (Previously Presented) The method of claim 12, wherein the metallocene is ruthenocene.

18. (Currently Amended) The method of claim 11, wherein contacting the exposed copper surface with a metallocene compound comprises flowing a gas containing metallocene over the partially fabricated IC.

19. (Previously Presented) The method of claim 12, wherein the depositing of a layer of material comprises contacting the exposed copper surface with a compound that forms a solid phase layer on the partially fabricated IC.

20. (Previously Presented) The method of claim 12, wherein the depositing of a layer of material comprises contacting the exposed copper surface with a diffusion barrier precursor, which reacts with an oxygen-containing species to form a barrier layer on the partially fabricated IC.

21. (Previously Presented) The method of claim 20, wherein the oxygen-containing species is molecular oxygen.

22. (Previously Presented) The method of claim 12, wherein depositing a layer of material comprises contacting the exposed copper surface with an etch stop precursor, which reacts with an oxygen-containing species to form an etch stop layer on the partially fabricated IC.

23. (Previously Presented) The method of claim 12, wherein the exposed copper surface comprises a copper seed layer on the partially fabricated IC.